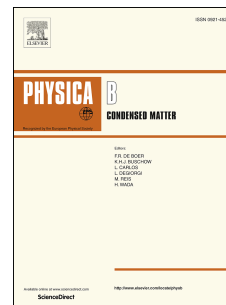


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Rietveld, cation distribution and elastic investigations of nanocrystalline $\text{Li}_{0.5+0.5x}\text{Zr}_x\text{Fe}_{2.5-1.5x}\text{O}_4$ synthesized via sol-gel route

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Rietveld, Cation Distribution and Elastic Investigations of Nanocrystalline $\text{Li}_{0.5+0.5x}\text{Zr}_x\text{Fe}_{2.5-1.5x}\text{O}_4$ Synthesized via Sol-gel Route

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Abstract

The present report deals with the structural and elastic behavior of Li^+ and Zr^{4+} substituted spinel ferrites. Nanocrystalline spinel ferrite system of chemical formula $\text{Li}_{0.5+0.5x}\text{Zr}_x\text{Fe}_{2.5-1.5x}\text{O}_4$ (where, $x = 0.0, 0.1, 0.2, 0.3, 0.4, 0.5$ and 0.6) was synthesized by using sol-gel auto combustion method. The as-prepared powder was annealed at 800°C for 5 h for better crystallinity. The annealed samples were characterized by X-ray diffraction technique and Fourier transform infrared spectroscopy for structural and elastic studies respectively. By applying the full pattern fitting of Rietveld method the x, y, z coordinates of atoms, unit cell dimensions and occupancy of ions were estimated. The lattice parameter was found to decrease after substitution due to increase in electron affinity. Site preferences of cations were obtained by matching experimental and calculated intensity. The characteristic bands of crystallographic sub-lattice for the cubic structure were observed by FTIR spectra.

Keywords: Li-Zr ferrite; Rietveld; Spinel; Cation distribution; Elastic properties.

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